

## Jinhaku Sonan's skipper type collection deposited at Taiwan Agricultural Research Institute (Lepidoptera: Hesperiidae)

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### Abstract

Of the 12 skipper taxa described by Jinhaku Sonan (1892–1984) from Taiwan and Hainan Island, 2 are recognized as valid species-level names, 4 as valid subspecies-level names, whereas the remaining 6 are considered junior subjective synonyms of other taxa. A revised status is established for a Hainan taxon, *Tagiades japetus hainana* Sonan, stat. rev., and *Polytremis kiraizana* (Sonan) is formally confirmed as a species endemic to Taiwan. The valid species-level names are *Ochlodes niitakanus* (Sonan) and *Polytremis kiraizana* (Sonan). The valid subspecies-level names are *Lobocla bifasciata kodairai* Sonan, *Pseudocoladenia dan sadakoe* Sonan & Mitono, *Notocrypta feisthamelii arisana* Sonan, and *Tagiades japetus hainana* Sonan. *Tagiades menaka kotoshona* Sonan is considered a junior subjective synonym of *T. trebellius martinus* Plötz, *Ampittia maro matsumurai* Sonan a junior subjective synonym of *Ampittia dioscorides etura* Mabille, *Parnara kotoshona* Sonan a junior subjective synonym of *Parnara guttata* (Bremer & Grey), *Parnara ranrunna* Sonan a junior subjective synonym of *Caltoris cahira austeni* (Moore), *Gangara thyrsis hainana* Sonan a junior subjective synonym of *Gangara thyrsis thyrsis* (Fabricius), and *Telicota palmarum hainanum* Sonan a junior subjective synonym of *Cephrenes acalle oceanica* (Mabille) in the present study.

**Key words:** Hesperiidae, Formosa, Hainan, taxonomy

### Introduction

The Japanese entomologist Dr. Jinhaku Sonan (1892–1984) is considered one of the most productive naturalists studying the fauna of Taiwan (Formosa) before and during World War II (Chu 2005). It was estimated over a hundred articles on the fauna of Taiwan were published by him during an approximate 30-year period from 1911, when he published his first entomological article on thrips, to the end of World War II (Wu 1996). He was considered one of the pioneer researchers on the agricultural pests of Taiwan, with pests of tea being the focus (Anonymous 1984). Besides applied entomology, Sonan also contributed considerably on taxonomy and biology of many insect groups, especially wasps and butterflies. The groups of insects he studied included Lepidoptera, Odonata, Hymenoptera (parasitic wasps), Hemiptera (cicadas), and Orthoptera (locusts); he even contributed on vertebrate study by writing an article on biology of pangolins and discovering the first salamander species from Taiwan (Wu 1996). In addition to the fauna of Taiwan, Sonan also published on the fauna of Japan and Hainan Island of southern China (Sonan 1930a, 1938a; Anonymous 1984).

In 1907, Sonan became an employee of the Agricultural Experiment Station, Government of Formosa, which was reorganized to the Department of Agriculture, Government Research Institute, in 1921 and the Agricultural Experimental Station in 1939, and finally established as Taiwan Agricultural Research Institute (TARI hereafter) in 1945 (Shih *et al.* 2002). During his entomological career, Sonan published 5 papers on skipper taxonomy, 3 on Taiwan and 2 on Hainan, and described 12 taxa. The types of these skippers were deposited in the collection of the institutes that represent the predecessors of TARI at Taipei. During that period, the predecessors of TARI were located adjacent to the Department of Entomology, Taiwan Imperial University (TIU, the predecessor of today's National Taiwan University, NTU), and entomological collections of both institutions were under the control of Dr. Tokuchi Shiraki, an influential Japanese entomologist at that period of time. The Lepidoptera collection under supervision of Shiraki was divided into two parts, with the "Rhopalocera" (butterflies and skippers) deposited in TARI and "Heterocera" (moths) in TIU. The insect and mite collection of TARI was founded in 1903 and located at Taipei (Shih *et al.* 2005). Sonan remained assigned with a position in TARI until 1947, when he returned to Japan at the age of 55 and changed his family name to Minamikawa, leaving all his entomological collection in Taiwan. As TARI was relocated to a new facility in Taichung [= Taizhong], the Rhopalocera part of the collection including Sonan's butterfly/skipper types was also moved with the institute.

Evans (1949) made the first effort to revise most of the skippers described by Sonan, and subsequent taxonomic decisions may be seen in Shirôzu (1960). However, neither author of these two major taxonomic works involving Sonan's skipper taxa seems to have examined any of Sonan's skipper types. Instead, they were based on study of the literature. We made the first attempt to examine and clarify the taxonomic status of the skipper taxa described by Sonan. During our survey, it was established that all of the types of skippers described by Sonan are present in the Sonan collection at TARI. We review the history of taxonomic changes of all these skipper taxa, and clarify taxonomic status whenever necessary.

## Material and methods

Specimens deposited in the Sonan collection hosted by TARI at Taichung, Taiwan, Republic of China, were examined for type materials of skippers. Types were stored in a type collection room separated from general collection. Types were verified using original descriptions and associated illustrations and collecting data, plus taxonomic notes published by various authors. Types of the other major collections involving Taiwan skippers were also examined to verify the taxonomic status of Sonan's skipper types.

## Results

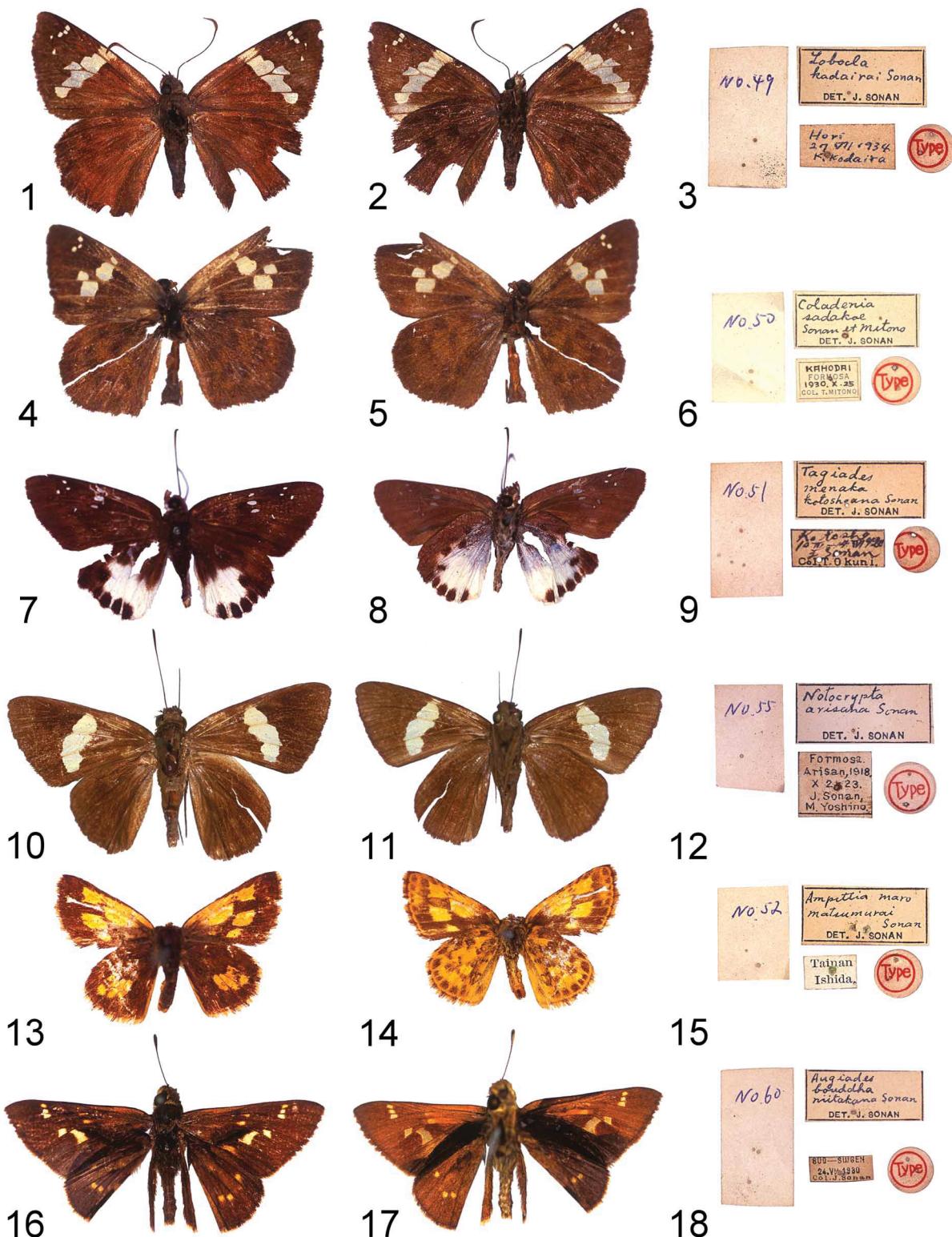
The majority of the 12 skipper taxa described by Sonan were monobasic, with only *Ampittia maro matsumurai* Sonan, 1936 and *Augiades bouddha niitakana* Sonan, 1936 involve multiple specimens. In these cases a holotype was specified, thus there is no need to designate a lectotype for any Sonan's skipper taxa.

## TAIWAN

### *Lobocla kodairai* Sonan, 1936

Zephyrus 6:209.

Labels (the slash denotes new line): "Lobocla/ kodairai Sonan/ DET. J. SONAN," "Hori/ 27 VII 1934/ K. Kodaira," "No. 49," "Type [in red]."



**FIGURES 1–18.** Types of skipper taxa described by Jinhaku Sonan: 1–3, holotype of *Lobocla kodairai*, upperside, underside, labels; 4–6, holotype of *Coladenia sadakoe*, upperside, underside, labels; 7–9, holotype of *Tagiades menaka kotoshona*, upperside, underside, labels; 10–12, holotype of *Notocrypta arisana*, upperside, underside, labels; 13–15, holotype of *Ampittia maro matsumurai*, upperside, underside, labels; 16–18. holotype of *Augiades bouddha niitakana*, upperside, underside, labels.

Only one female specimen (Fig. 1–2) was included in Sonan's (1936) original description of this taxon. The material bearing the type label (Fig. 3) matches the original description. Evans (1949) treated *kodairai* as a

synonym of *Lobocla bifasciata* (Bremer & Grey, 1853), while Shirôzu (1944, 1960) retained the name *kodairai* as a subspecific name. *Lobocla bifasciata* shows tremendous variation especially in male genitalia (Evans 1949). There is no doubt that this taxon belongs to *bifasciata* or its complex because its male genitalia (Shirôzu 1960) agree with those of *bifasciata*, but in order to judge whether the Taiwanese taxon is distinct or not, further investigation is required. Evans (1949) suspected that *kodairai* might be represented by a stray specimen, evidently an erroneous view as this taxon has been shown to be a montane skipper native to the island (Shirôzu 1960; Yamanaka 1980). We tentatively follow Shirôzu's (1944, 1960) treatment, regarding *kodairai* Sonan, 1936 as a subspecific name of *Lobocla bifasciata* (Bremer & Grey, 1853).

***Coladenia sadakoe* Sonan & Mitono, 1936**

Zephyrus 6:184

Labels: "Coladenia/ sadakoe/ Sonan et Mitono/ DET J. SONAN," "KAHODAI/ FORMOSA/ 1930.X.25/ COL. T MITONO," "No. 50," "Type [in red]."

A single female was designated as the holotype in the original description (Sonan and Mitono 1936) and the specimen (Fig. 4–6) examined from TARI matches the description. Evans (1949) listed this taxon as a synonym of *C. agni igna* Semper, 1892 without giving any reason. This treatment was followed by Shirôzu (1960) and Bridges (1983). The type specimen shows the characteristics of *Pseudocoladenia dan* (Moore 1881) rather than *C. agni igna* (Shimonoya & Murayama 1976). This viewpoint was accepted by subsequent authors (e. g. Yamanaka 1980; Uchida 1991; Chiba *et al.* 1992; Uchida 1995; Hsu *et al.* 2007). The name *sadakoe* Sonan & Mitono, 1936 is considered a valid subspecific name for *P. dan* from Taiwan in the present study.

***Tagiades menaka kotoshona* Sonan, 1936**

Zephyrus 6:212.

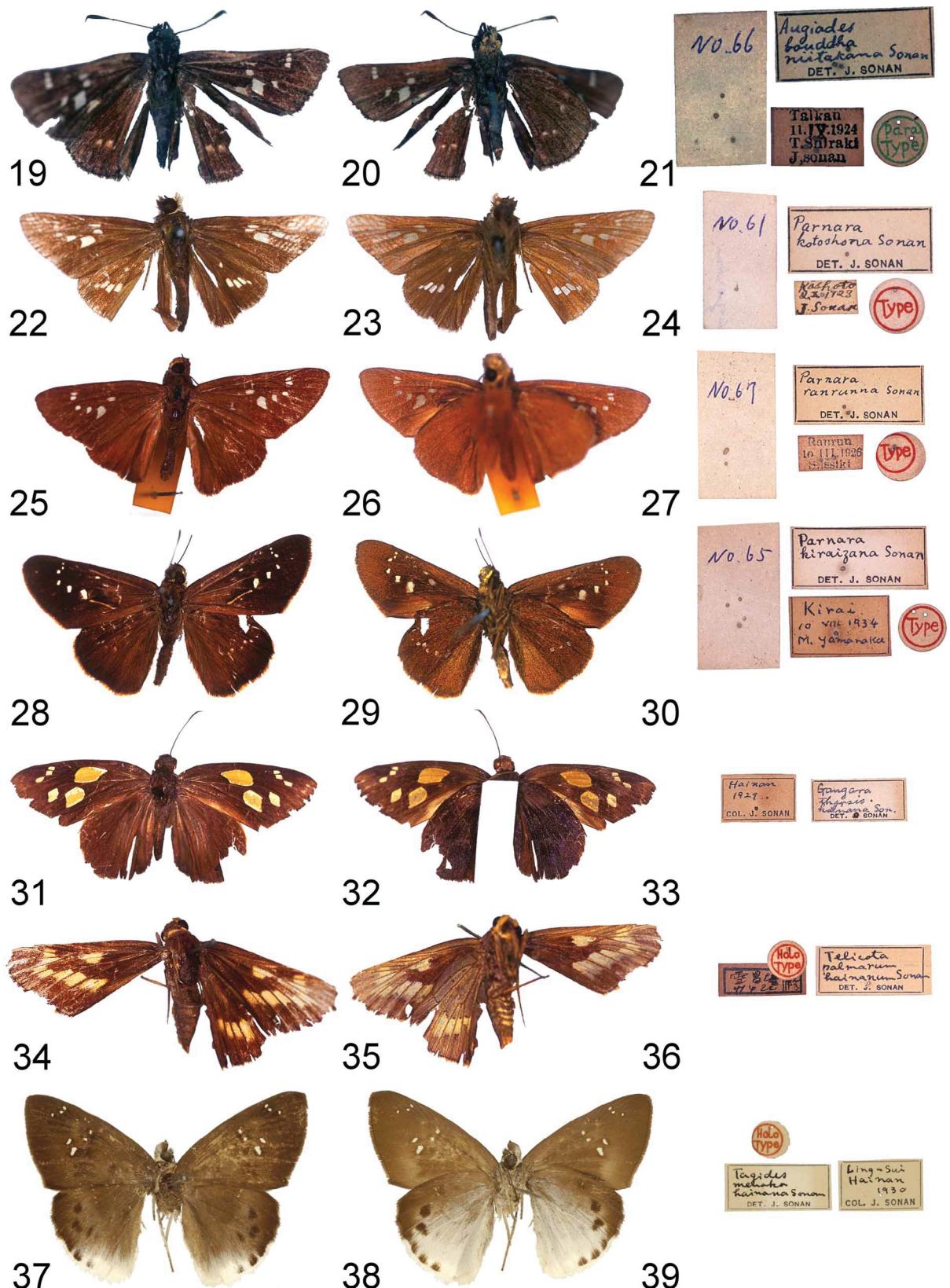
Labels: "Tagiades/ menaka/ kotoshoana Sonan DET. J. SONAN," "Kotosho/ 10 III – 14 IV 1920/ J. Sonan/ Col. T. Okuni," "No. 51," "Type [in red]."

A single male specimen was designated as the holotype in the original description and the specimen bearing the type label matches the description (Fig. 7–9). Evans (1949) listed *kotoshona* as a synonym of *T. litigiosa litigiosa* Möschler, 1878. Again, no reason was given. Umeno (1937) pointed out that no diagnostic features could be identified between *kotoshona* and "*Tagiades menaka martinus* Pätz [sic]." Shirôzu (1943) subsequently treated *kotoshona* as a synonym of *T. trebellius martinus* Plötz, 1884. This treatment was followed by subsequent authors (e. g. Shirôzu 1960; Chiba *et al.* 1992; Tsukiyama *et al.* 1997). The type shows the characteristics of *T. trebellius martinus*, which is the only *Tagiades* found in Kotosho (= Lanyu) (Shirôzu 1960, Yamanaka 1980), a small island off the southeastern coast of Taiwan. Neither *T. menaka* Moore, 1865 nor *litigiosa* has been confirmed from Taiwan (Chiba *et al.* 1992). The name *kotoshona* Sonan, 1936 is regarded as a junior subjective synonym of *T. trebellius martinus* Plötz, 1884 in the present study.

***Notocrypta arisana* Sonan, 1930**

Zephyrus 2:175, Tab. 14, fig. 7.

Labels: "Notocrypta/ arisana Sonan/ DET. J. SONAN," "Formosa/ Arisan 1918./ X 2–23/ J. SONAN/ M. YOSHINO," "No. 55," "Type [in red]."



**FIGURES 19–39.** Types of skipper taxa described by Jinhaku Sonan: 19–21, paratype of *Augiades bouddha niitakana*, upperside, underside, labels; 22–24, holotype of *Parnara kotoshona*, upperside, underside, labels; 25–27, holotype of *Parnara ranrunna*, upperside, underside, labels; 28–30, holotype of *Pamara kiraizana*, upperside, underside, labels; 31–33, holotype of *Gangara thrysia hainana*, upperside, underside, labels; 34–36, holotype of *Telicota palmarum hainanum*, upperside, underside, labels; 37–39, holotype of *Tagiades menaka hainana*, upperside, underside, labels.

A male specimen was designated as the [holo]type in the original description (Sonan 1930b), and the holotype was retrieved in TARI (Fig. 10–12). Evans (1949) listed *arisana* as a synonym of *Notocrypta paralyos asawa* Fruhstorfer, 1911, and this treatment was followed by Bridges (1983). However, *N. paralyos* has not been recorded on the main island of Taiwan (Chiba *et al.* 1992). Shirôzu (1960) considered *arisana* a melanin form of *N. curvifascia*. Based on the investigation by Hiroshi Tsukiyama, Morishita (1978) treated it as a subspecies of *N. feisthamelii* (Boisduval, 1832). This treatment was followed by subsequent authors (e. g. Yamanaka 1980; Hsu & Li 1989; Chiba *et al.* 1992), and is accepted by the present study.

### ***Ampittia maro matsumurai* Sonan, 1936**

Zephyrus 6:213.

Labels: “Ampittia maro/ matsumurai/ Sonan/ DET. J. SONAN,” “Taiwan/ Ishida,” “No.52,” “Type [in red].”

A male specimen was designated as the holotype by Sonan (1936), and this holotype was retrieved in TARI (Fig. 13–15). Evans (1949) considered this taxon a synonym of *Ampittia dioscorides etura* Mabille, 1891 described from Hong Kong. This treatment was followed by subsequent authors (e. g. Yamanaka 1980; Bridges 1983; Hamano 1987; Chiba *et al.* 1992). The name *matsumurai* Sonan, 1936 is regarded as a junior subjective synonym of *Ampittia dioscorides etura* Mabille, 1891 in the present study.

### ***Augiades bouddha niitakana* Sonan, 1936**

Zephyrus 6:213.

Labels: “Augiades/ bouddha/ niitakana Sonan/ DET. J. SONAN,” “800- SUIGEN/ 24 VII 1930/ Col. J. Sonan,” “No. 60,” “Type [in red].”

A male specimen was designated as the holotype by Sonan (1936), and this holotype was retrieved in TARI (Fig. 16–18). Evans (1949) treated this taxon as a subspecies of *Ochlodes siva* Moore, 1878, and this treatment was followed by Bridges (1983). Shirôzu (1960), however, considered this taxon a synonym of *Augiades sylvanus* var. *formosana* Matsumura, 1919, which was recognized to represent a valid subspecies of *Ochlodes subhyalina* (Bremer & Grey, 1853) by Evans (1949). Based on the characteristics of male genitalia, Chiba and Tsukiyama (1996) subsequently raised *formosana* to species status, and considered it a species endemic to Taiwan. Hsu *et al.* (2006), however, found that *formosana* Matsumura, 1919 is actually a junior subjective synonym of *Ochlodes venata* (Bremer & Grey, 1853), so *niitakana* Sonan, 1936 should be resurrected in the combination *Ochlodes niitakanus*. Shirôzu (1960) claimed that the allotype female of *niitakana* was probably a different species. His statement seems to be groundless. We examined the female paratype of *niitakana* (Fig. 19–21) and confirmed that it was conspecific with the male holotype.

### ***Parnara kotoshona* Sonan, 1936**

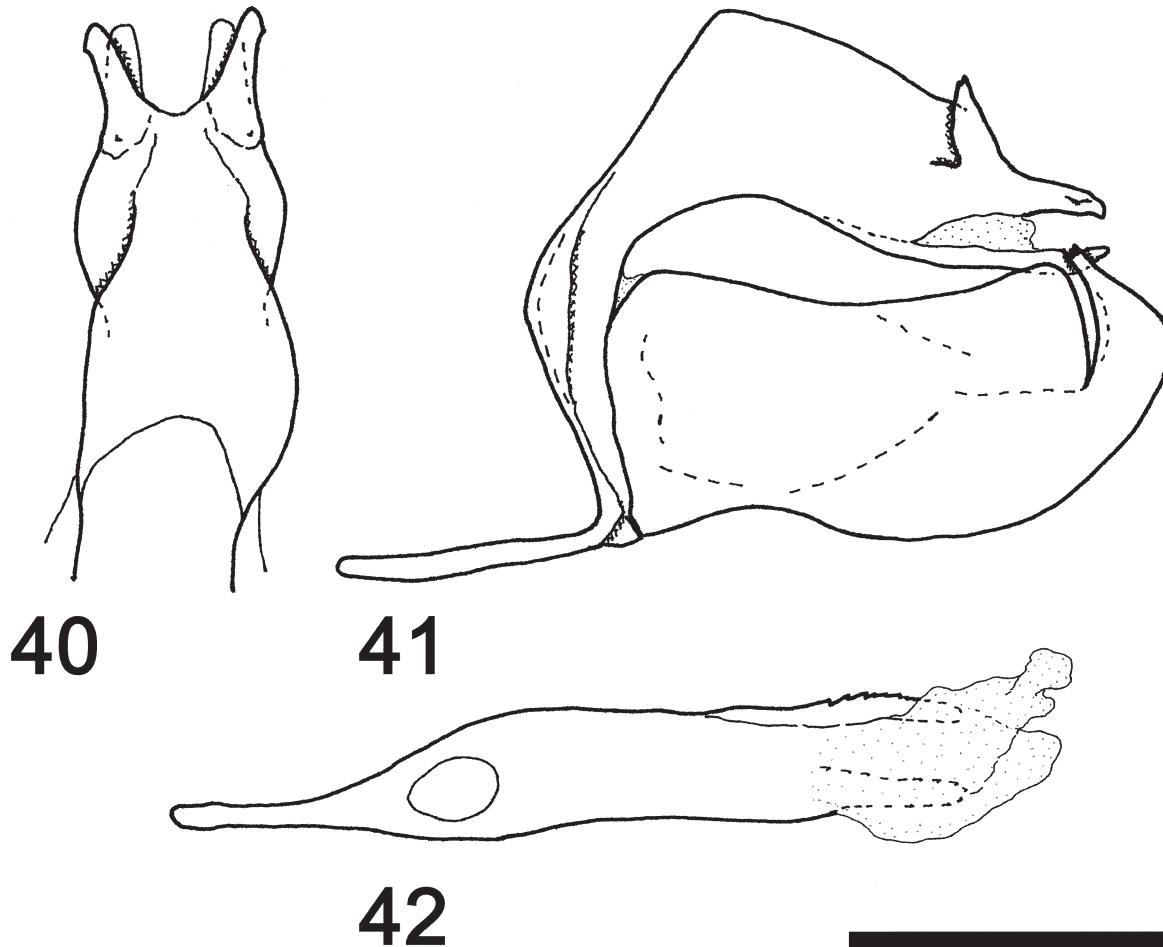
Zephyrus 6:214.

Labels: “Parnara/ kotoshona Sonan/ DET. J. SONAN,” “Kashoto/ 2 X 1923/ J. Sonan,” “No. 61,” “Type [in red].”

A male specimen was designated as the holotype by Sonan (1936), and the holotype was retrieved from TARI (Fig. 22–24). Evans (1949) synonymized this taxon with *Parnara guttata* (Bremer & Grey, 1853). His treatment has been followed by all subsequent authors (e. g. Shirôzu 1960; Bridges 1983; Chiba & Eliot 1991; Chiba *et al.* 1992; Tsukiyama *et al.* 1997). The name *kotoshona* Sonan, 1936 is regarded as a junior subjective synonym of *Parnara guttata* (Bremer & Grey, 1853) in the present study.

An inconsistency in locality was found between the identification label and data label of the holotype. The collecting locality is given as “Kotosho” (= Lanyu) on the identification label whereas it is “Kashoto” (=

Ludao) on the data label. Sonan (1936) gave “Kotosho” as the type locality in the original description of *kotoshona*. These two islands are separated by approximately 73 km, and *P. guttata* is more commonly found on Ludao than on Lanyu (Yamanaka 1980). Sonan may have misread his own hand-writing on the data label when he decided to describe his specimens as a new species over 10 years after he collected the specimens. Consequently the true type locality of *kotoshona* perhaps should be Kashoto (Ludao), not Kotosho (Lanyu).



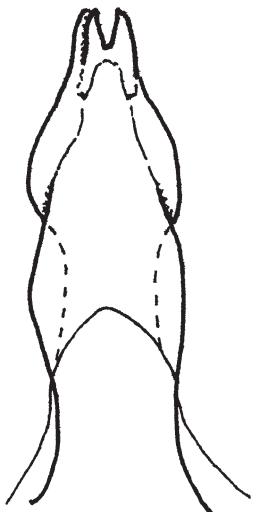
**FIGURES 40–42.** Male genitalia of *Polytremis kiraizana* (based on a specimen collected from “Formosa [=Taiwan], Sept 1974”): 40, dorsal view of tegumen, 41, lateral view of 9th + 10th sclerites with left valva attached, 42, dorsal view of phallus. Scale bar = 1 mm.

#### *Parnara ranrunna* Sonan, 1936

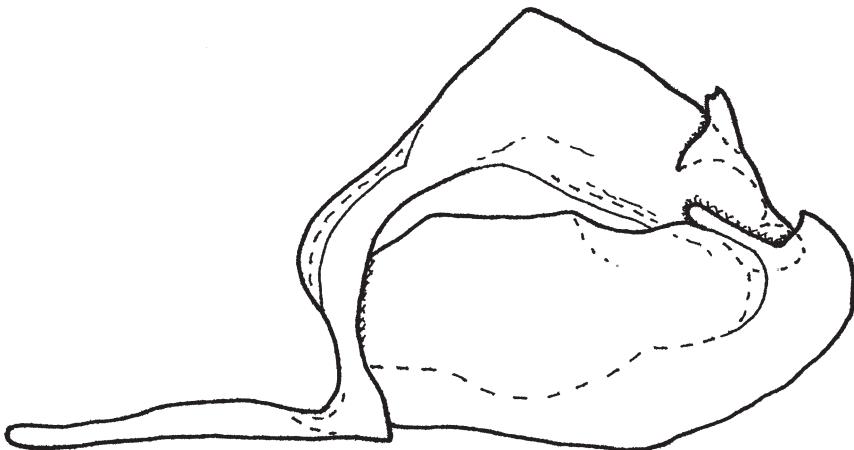
Zephyrus 6:215.

Label: “Parnara/ ranrunna Sonan/ DET. J. SONAN,” “Ranrun/ 10 III 1926/ S. Isshiki,” “No. 67,” “Type [in red].”

A single male specimen was designated as the holotype by Sonan (1936), and the holotype was retrieved from TARI (Fig. 25–27). Evans (1949) synonymized this taxon with *Caltoris bromus yanuca* Fruhstorfer, 1911. However, his treatment was not followed by most subsequent authors (e. g. Shirôzu 1960; Hamano 1986; Chiba *et al.* 1992), who retained it as a distinct *Caltoris* species. Yamanaka (1980), citing an unpublished idea from Hiroshi Tsukiyama, regarded this taxon as a junior synonym of *Caltoris cahira austeni* (Moore, 1884). This viewpoint was endorsed by Hsu and Wang (2005), and accepted by the present study.



43



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**FIGURES 43–45.** Male genitalia of *Polytremis mencia* (based on a specimen collected from “Tianmushan, Zheziang [=Zhejiang Province], [China], May–June 1982”): 43, dorsal view of tegumen, 44, lateral view of 9th + 10th sclerites with left valva attached, 45, dorsal view of phallus. Scale bar = 1 mm.

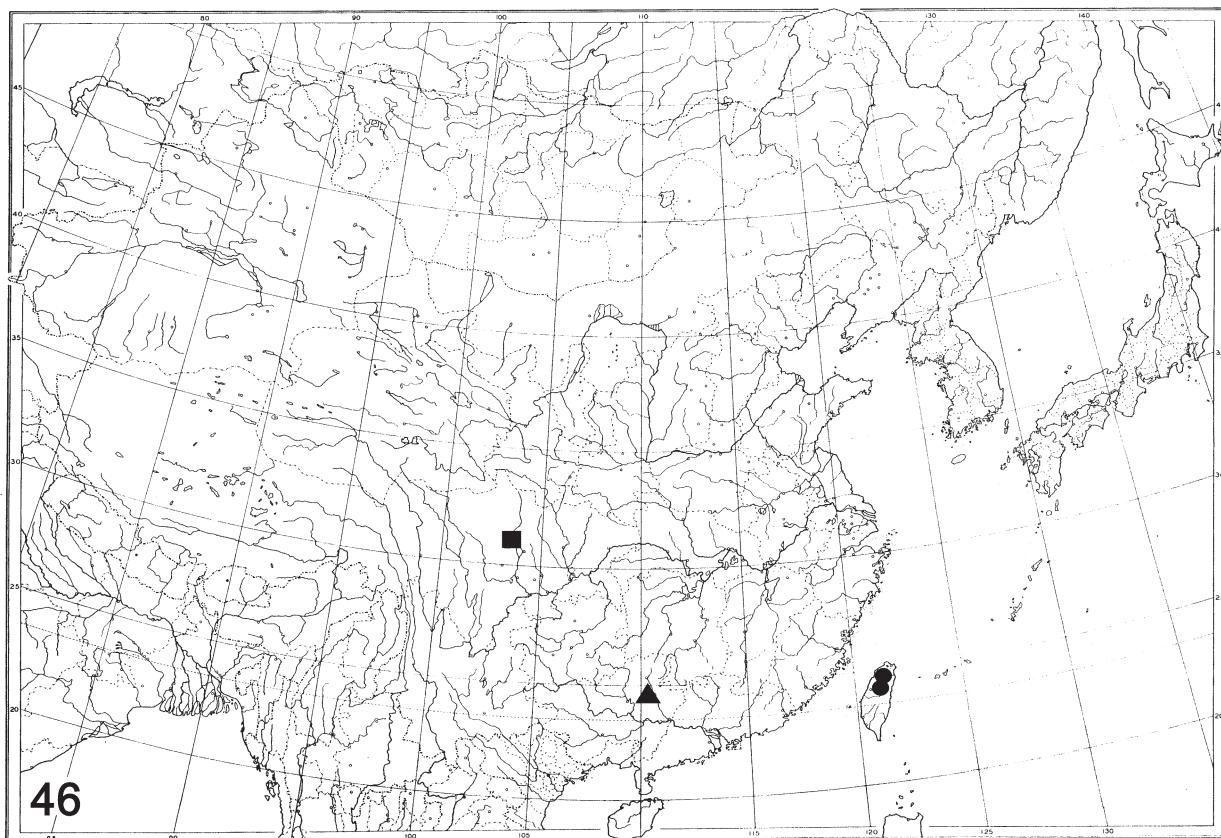
#### *Parnara kiraizana* Sonan, 1938

Zephyrus 7:255.

Labels: “Parnara/ kiraizana Sonan/ DET. J. SONAN,” “Kirai/ 10 VIII 1934/ M. Yamanaka,” “No. 65,” “Type [in red].”

A male was designated as the [holo]type when Sonan (1938b) described this taxon, and the holotype was retrieved from TARI (Fig. 28–30). Evans (1949) treated this taxon as a subspecies of *mencia* Moore, 1877 [as *Polytremis mencia kiraizana*]. Shirôzu (1960) viewed it as a distinct species but transferred it to the genus *Pelopidas* without giving a rationale. He probably judged by the general appearance of *kiraizana*, notably the male stigma on the upperside of the forewing. Shirôzu’s treatment was followed by a few subsequent authors (e. g. Yamanaka 1980). However, this transfer was inappropriate, as the mesotibia of *kiraizana* possess no spines, a diagnostic character for the genus *Polytremis*, whereas the mesotibia of *Pelopidas* species possess prominent spines (Evans 1949; Kawazoé & Wakabayashi 1976; Tsukiyama *et al.* 1997). This point was recognized by a few authors, who considered *kiraizana* a species endemic to Taiwan and used the combination of *Polytremis kiraizana* for the taxon (e. g. Hamano 1986; Sugiyama 1999). Nevertheless, this combination is never explicitly proposed, and no comparison between *mencia* and *kiraizana* was performed. The male genitalia of *kiraizana* (Fig. 40–42) and those of *mencia* (Fig. 43–45) are considerably different, thus we support that the combination of *Polytremis kiraizana* should be applied to this taxon (**confirmed status**). Although both *P. suprema* Sugiyama, 1999 from Guangxi and *P. matsuii* Sugiyama, 1999 from Sichuan may

be good candidates for continental relatives, *P. kiraizana* is regarded as an endemic Taiwanese species for the present (Fig. 46).



**FIGURE 46.** A map showing the distribution of *Polytremis kiraizana* Sonan and taxa closely related to the species: Circle denotes *P. kiraizana*, triangle *P. suprema* and square *P. matsuii*.

## HAINAN

### *Gangara thyrsis hainana* Sonan, 1930

Trans. nat. Hist. Soc. Formosa 20: 37.

Labels: “Gangara/ thyrsis/ hainana Son./ DET. J. SONAN,” “thyrsis,” “hainana/ Sonan,” “Hainan 1929[?].”

Sonan (1930a) specified “one mall[e]” when he described *Gangara thyrsis hainana*, thus it represents the holotype of the taxon. This holotype was found in TARI (Fig. 31–33). Evans (1949) listed *hainana* as a synonym of *Gangara thyrsis thyrsis* (Fabricius, 1775). *Gangara thyrsis* is widespread from the Himalayas across India and Sundaland to the Philippines and Sulawesi with weak geographical differentiation (Evans 1949), and we follow Evans’ treatment. The name *hainana* Sonan, 1930 is regarded as a junior subjective synonym of *Gangara thyrsis thyrsis* (Fabricius, 1775) in the present study.

### *Telicota palmarum hainanum* Sonan, 1938

Trans. nat. Hist. Soc. Formosa 28: 370, fig. 2.

Labels: “*Telicota/ palmarum/ hainanum* Sonan/ DET. J. SONAN,” “*palmarum*,” “*hainana/ Sonan*,” “Xuechanglu [In Chinese]/ [Meiji] 41 [=1908] 4 22,” “Holo/ Type [in red].”

Sonan (1938a) specified a male [actually female] specimen when he described *Telicota palmarum hainanum* Sonan, thus it represents the holotype. This holotype was located in TARI (Fig. 34–36), and the specimen conforms to the original description (p. 370) and associated figure (fig. 2) given by Sonan (1938). Evans (1949) listed *hainanum* as a synonym of *Cephrenes chrysozona oceanica* (Mabille, 1904). Maruyama (1991) pointed out that the correct name for this taxon should be *Cephrenes acalle oceanica*, and his treatment has been followed by de Jong & Treadaway (1993). Consequently the name *hainanum* Sonan, 1938 is regarded as a junior subjective synonym of *Cephrenes acalle oceanica* (Mabille, 1904) in the present study.

### ***Tagiades menaka hainana* Sonan, 1938**

Trans. nat. Hist. Soc. Formosa 28: 370, fig. 1.

Labels: “*Tagiades/menaka/hainana* Sonan DET. J. SONAN,” “Ling-sui/Hainan/ 1930/COL. J. SONAN,” “menata,” “hainana/Sonan,” “Holo/Type [in red],” “HES(3)”

Sonan (1938a) specified just one male specimen when he described *Tagiades menaka hainana*, thus it represents the holotype of the taxon. The unique type (holotype) of the taxon was found in TARI (Fig. 37–39), and the specimen conforms to the original description and associated figure in Sonan (1938a) although the collecting year was “1908” in the original description but “1930” on the label. Evans (1949) intended to list *hainana* as a synonym of *Tagiades menaka menaka* (Moore, 1865), but the name *hainana* was in the index of his catalogue and not in the text. The characteristics of the holotype, however, do not agree with those of *T. menaka*. Instead, the holotype possesses diagnostic characters of *T. japerus* (Stoll, 1782) defined by Evans (1949) and Tsukiyama (1980) as it has no hyaline spot in front of spots at the end of discoidal cell and a prominent hyaline spot in cell  $M_3$  and  $Cu_1$  of the forewing (Fig. 37–38). The wing markings of the specimen are generally similar to those of the wet season form of *T. j. ravi* Moore, 1865, but differ from it by possessing a white hindwing fringe instead of brown. Although it is difficult to accept the fact that this rather common skipper is represented by a single specimen, there is no specific evidence that it was mislabelled. Thus the name *hainana* may be used as the valid subspecific name for populations of *T. japerus* (**status revised**) inhabiting the island pending further research.

### **Acknowledgments**

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